INVASIVE AQUATIC PLANTS

What a tangled web they weave

Impacts on the Ecology and Fishery of Tennessee River Lakes

&

Control Measures

Timothy Joseph, PhD.

Chairman

WBEFC

WATTS BAR ECOLOGY AND FISHERY COUNCIL

WBEFC.ORG

WBEFC

WATTS BAR ECOLOGY AND FISHERY COUNCIL

Birth of the Council

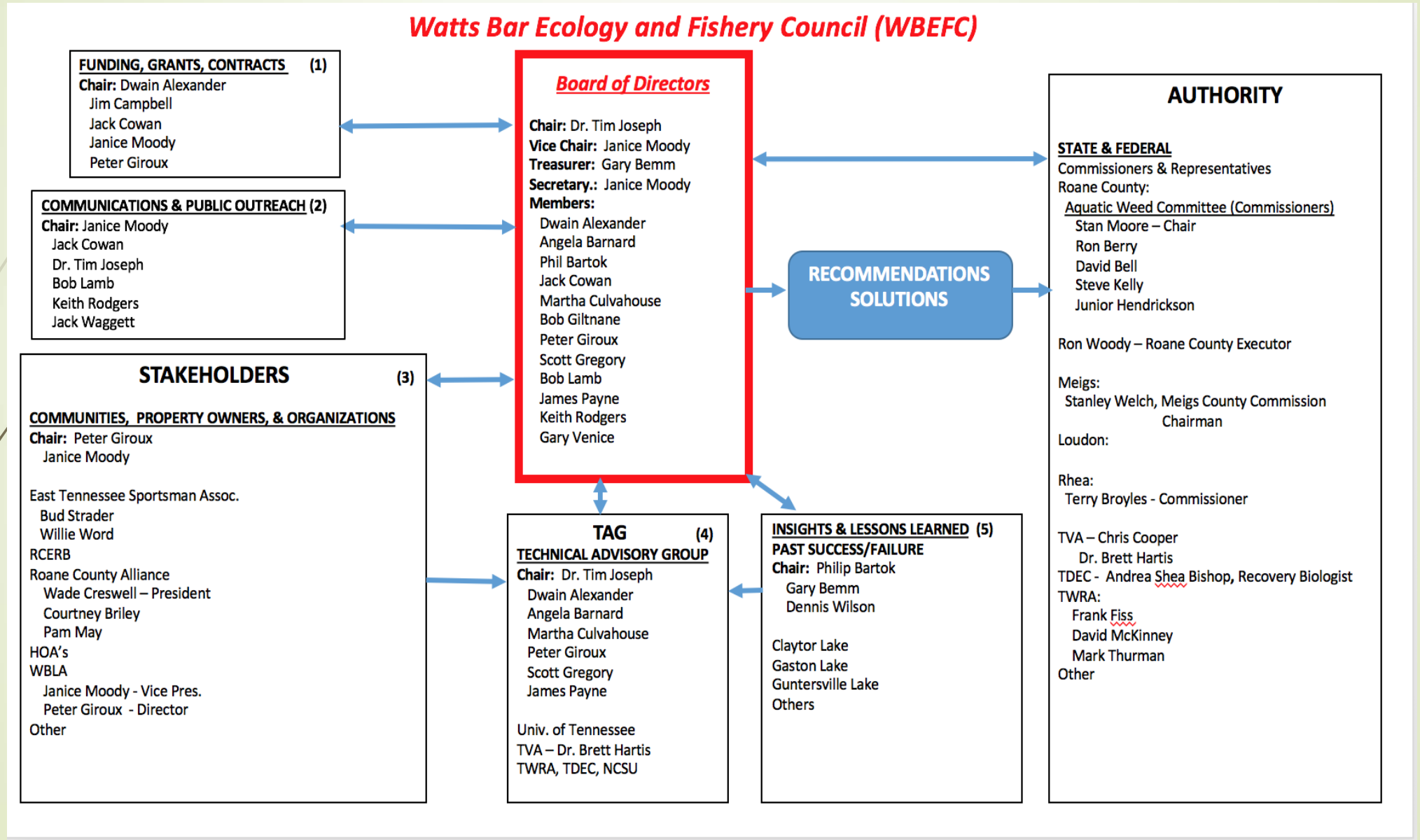
- Roane County Commission: Formed the ***Roane County Aquatic Weeds Committee*** -- Five Commissioners
- Needed factual, science based information on the impacts of invasive aquatic plants, and recommendations on control measures
- Reached out to me because of my extensive education and expertise in Fisheries Biology/Limnology. Asked if I would help form a Stakeholder group to address the problem.

First Order of Business

- Formalize Council Structure, Establish a BOD
- Obtained Our 501(c)3, Non-profit Status
- Establish 5-Work Groups
- **PROFESSIONAL WEBSITE** – Hire Website Developer
- Populate Website

WBEFC
WATTS BAR ECOLOGY AND FISHERY COUNCIL

Council Structure



WBEFC

WATTS BAR ECOLOGY AND FISHERY COUNCIL

Mission Statement

To protect and advance the ecological health of Watts Bar Lake for the benefit of all stakeholders (property owners, communities, fishermen, sportsmen, recreational users, marinas, and navigation). This mission will be accomplished through the following steps: assess environmental problems which reduce or limit the ecological health and use of the lake; research technical solutions; select best or proven alternatives; evaluate likelihood of success; and recommend solutions/actions to the appropriate local, county, state, and federal agencies and commissions. At present, the focus of this Council is to address the control and reduction invasive aquatic plant species rapidly taking over the littoral zone/shallow water: the critically important area for high quality lake environment and fishery.


WBEFC
Watts Bar Ecology and Fishery Council
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Tennessee River Ecosystem
WBEFC
To protect and advance the ecological health of Watts Bar Lake for the benefit of all stakeholders
Read about our current activities

WBEFC

Watts Bar Ecology and Fishery Council

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- Mission Statement
- WBEFC Structure
- Board of Directors
- Meeting & Minutes
- Work Groups
- By-Laws
- Code of Ethics

- Noxious Weeds
- Private Applicators
- Surveys
- Control Options
- TVA Video
- Chemical Control

- Ecology/Fishery Primer
- Fish Disease
- Improve the Fishery
- Professional Fishermen

- Funding
- Contribution

- Tech Documents
- Photos
- News Media
- Videos

Hydrilla

(Hydrilla Verticillata L.f Royle)

Introduction

Hydrilla, a native plant of Asia, was first introduced to the United States in Florida in 1960. Since its introduction it has spread rapidly throughout the United States. Hydrilla's ability to survive well in freshwater reservoirs and rivers has allowed it to become problematic. Reduced water flow, associated with clogged irrigation and/or water control structures, interferences with navigation, boating, swimming, and fishing are some of the negative impacts caused by extensive hydrilla growth. Hydrilla populations have also been known to outcompete and displace native aquatic plants, such as pondweeds (Potamogeton spp.). The dense plant canopy produced in an established hydrilla bed makes it difficult for other aquatic plants to flourish.

Description

Hydrilla is a submersed plant that grows in a variety of water conditions. It is a very versatile plant species and can grow in both static and flowing water, from a few centimeters to 15 meters (m) in depth. The depth at which hydrilla can become established is often dependent on water turbidity, although it is a shade tolerant species. Hydrilla can be found in a variety of water chemistry situations and due to its growth and reproduction habits hydrilla has been referred to as "the perfect aquatic weed". Both dioecious and monoecious types are present in the Tennessee Valley. Stems are ascending towards the water surface and often branch out when they reach the water surface. Leaves are sessile occur in whorls, mostly 4-8 leaves per whorl. Leaves are typically 1.5 cm in length, oblong, and have serrate leaf margins. Flowers are very small and rise from the leaf axils.

Regulation

Hydrilla is listed as a federal noxious weed.

Distribution

Hydrilla is found throughout the United States from Maine down the east coast to Florida. It is also found throughout the Midsouth from Georgia to Texas and north to Indiana. It has also been documented in Washington, California, and Arizona on the west coast. It is currently present in the Tennessee Valley Reservoir System.

Hydrilla leaves occur in whorls, with 4-8 leaflets per whorl. Leaves are oblong in shape with serrate leaf margins. Photo by Bradley Sartain.

Hydrilla plants produces "tubers" in the sediment like the one shown above. Tubers are capable of remaining viable in sediment for several years, making hydrilla difficult to manage. Although hydrilla is controlled in a specific area, a tuber bank could have been established that is capable of producing plants in the future. Photo by Bradley Sartain.

Hydrilla can produce large monotypic stands that make boat navigation nearly impossible. Photo by Bryan Goldsby.

Eurasian Watermilfoil

(Myriophyllum Spicatum L.)

Introduction

Eurasian watermilfoil is a submersed plant that was introduced in several locations in the United States from Europe in the 1940's. It has the ability to form dense mats within infested areas. These dense mats often shade out desired native species, alter macro invertebrate communities, and may interfere with fish spawning in shallow areas. Invasion and explosive growth of Eurasian watermilfoil can displace native plants and reduce species diversity within the invaded area.

Description

Eurasian watermilfoil is a submersed perennial aquatic plant that most often occurs in waters 1-4 meters deep. Leaves are whorled around a glabrous stem. Leaves are typically 1.5-4.0 cm long and occur in 4 leaves per whorl. The leaves are highly divided "feather like" and consist of 14-24 pairs. Inflorescences is a terminal spike (5-20 cm). Flowers are formed on short aerial stems that contain both pollen bearing "male" and seed producing "female" flowers.

Regulation

Eurasian watermilfoil is not listed as a federal noxious weed

Distribution

Eurasian watermilfoil is found throughout the United States and North America. It has been documented from Florida to Quebec in the east, across the central US, and from California to Alaska in the west. It is currently found in the Tennessee Valley Reservoir Systems.

Reproduction

Eurasian watermilfoil is capable of reproducing sexually and asexually, with asexual reproduction being the most important. Small buds can form on root crowns and detach at the end of winter allowing new plants to be established early in the spring. During peak growing season stems can release numerous fragments (10-20 cm) either naturally or by plants being broken by wave action or human activities. These fragments are often viable and allow new plants to become established in new areas.

References

Aiken, S.G., P.R. Newroth, and I. Wile. 1979. The biology of Canadian weeds. 34. Myriophyllum spicatum. L. Can. J. Plant Sci. 59:201-215.

Newroth, P.R. 1985. A review of Eurasian Water milfoil impacts and management in British Columbia pp. 139-153. In: Proc. First Int. Symp. On watermilfoil (Myriophyllum spicatum) and related Holoragaceae species July 23-24, 1985. Vancouver, BC, Canada. Aquatic Plant Management Society, Inc.

Smith, C.S. and J.W. Barko. 1990. Ecology of Eurasia watermilfoil. J. Aquat. Plant Manage. 28:55-64.

Madsen, J.D. 2009. Eurasian Watermilfoil. In: Biology and Control of Aquatic Plants: A Best Management Practices Handbook. (eds) Gettys, L.A., Haller, W.T., and Bellaud, M. pp.95-97.

Eurasian watermilfoil shown growing beneath the water surface, leaves are highly divided and "feather like." Photo by Dr. John Madsen

Stem fragment of Eurasian watermilfoil that is capable of producing a new plant. Photo by Dr. John Madsen.

Eurasian watermilfoil is capable of producing large monotypic stands that often shade out desirable native plant species and impede boat operation. Photo by Bryan Goldsby.

TVA System Reservoirs

Melton Hill – 5,470 Acres
193 Miles of Shoreline

Fort Loudon – 14,600 Acres
379 Miles of Shoreline

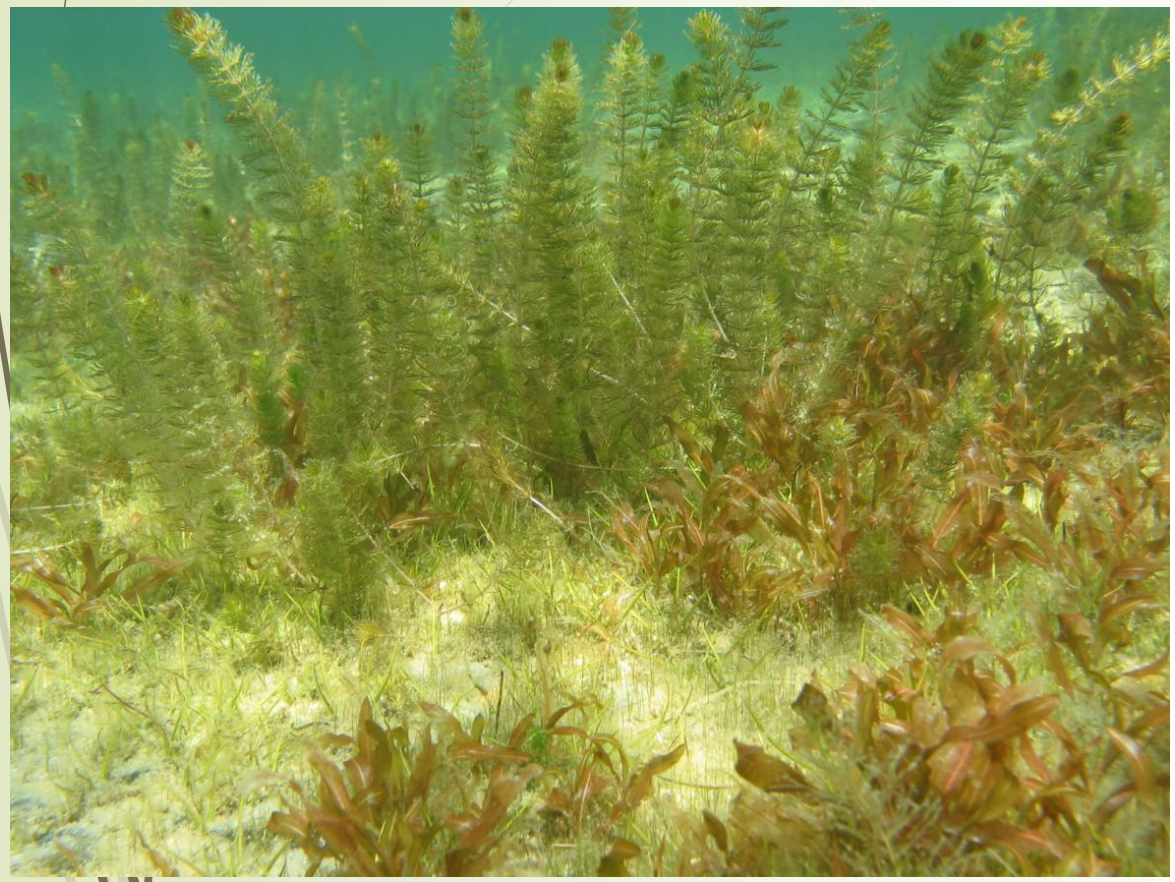
Watts Bar 39,090 Acres
722 Miles of Shoreline

Chickamauga 36,240 Acres
784 Miles of Shoreline

Guntersville 67,900
890 Miles of Shoreline

If Invasive Species Behaved Themselves They Would "Improve" Ecosystem Health

- It is not the **Species** that is harmful, it's the growth rate - **Density**



Positive -- Productive

Negative – Destructive

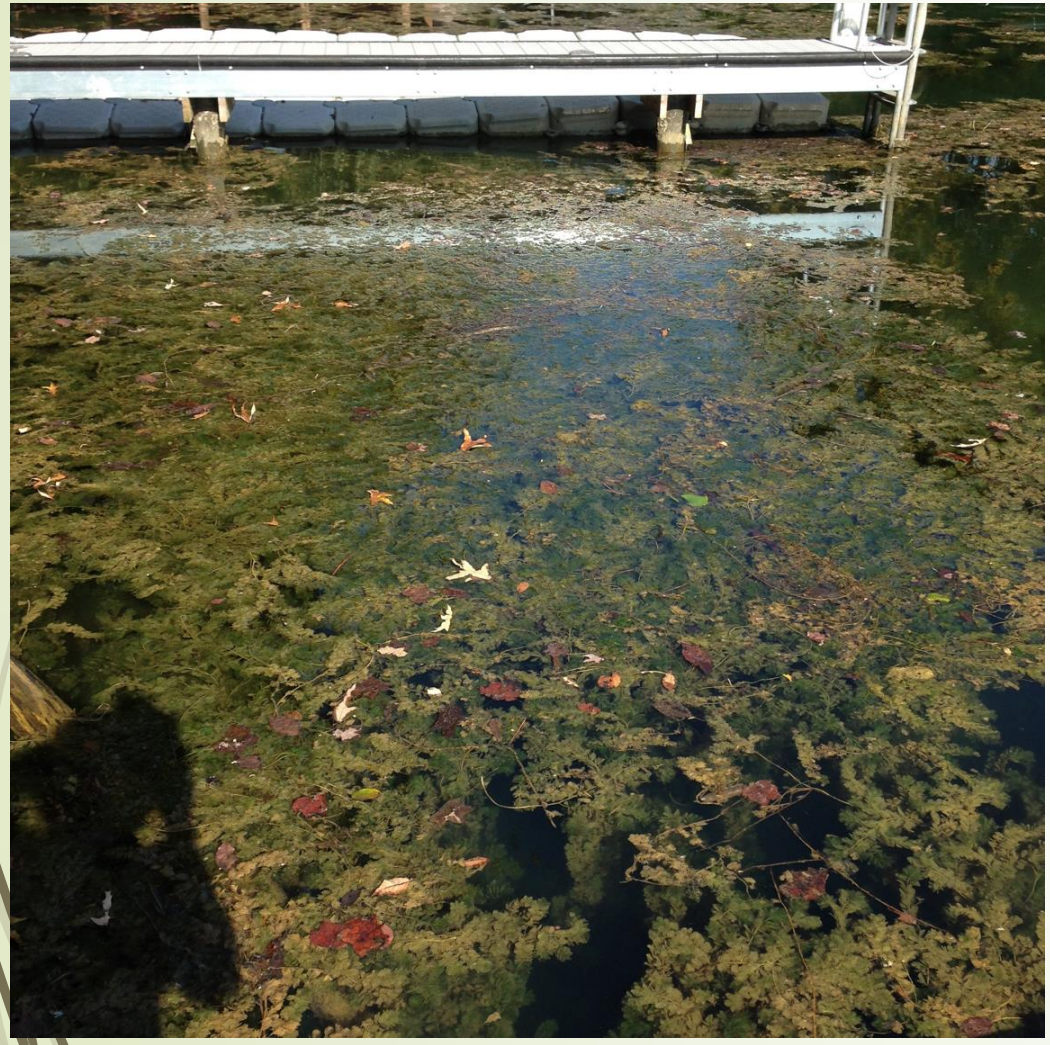
From This

To This

When Left Alone

Eurasian Watermilfoil

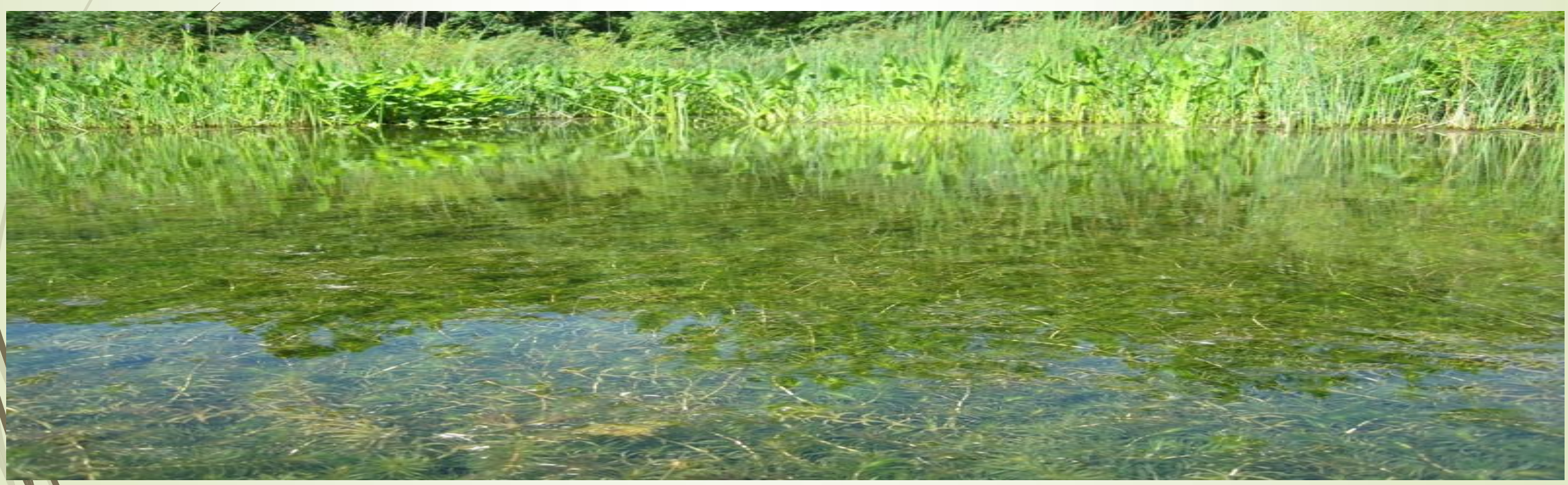
Eurasian Watermilfoil



Hydrilla – Faster and Denser Growth

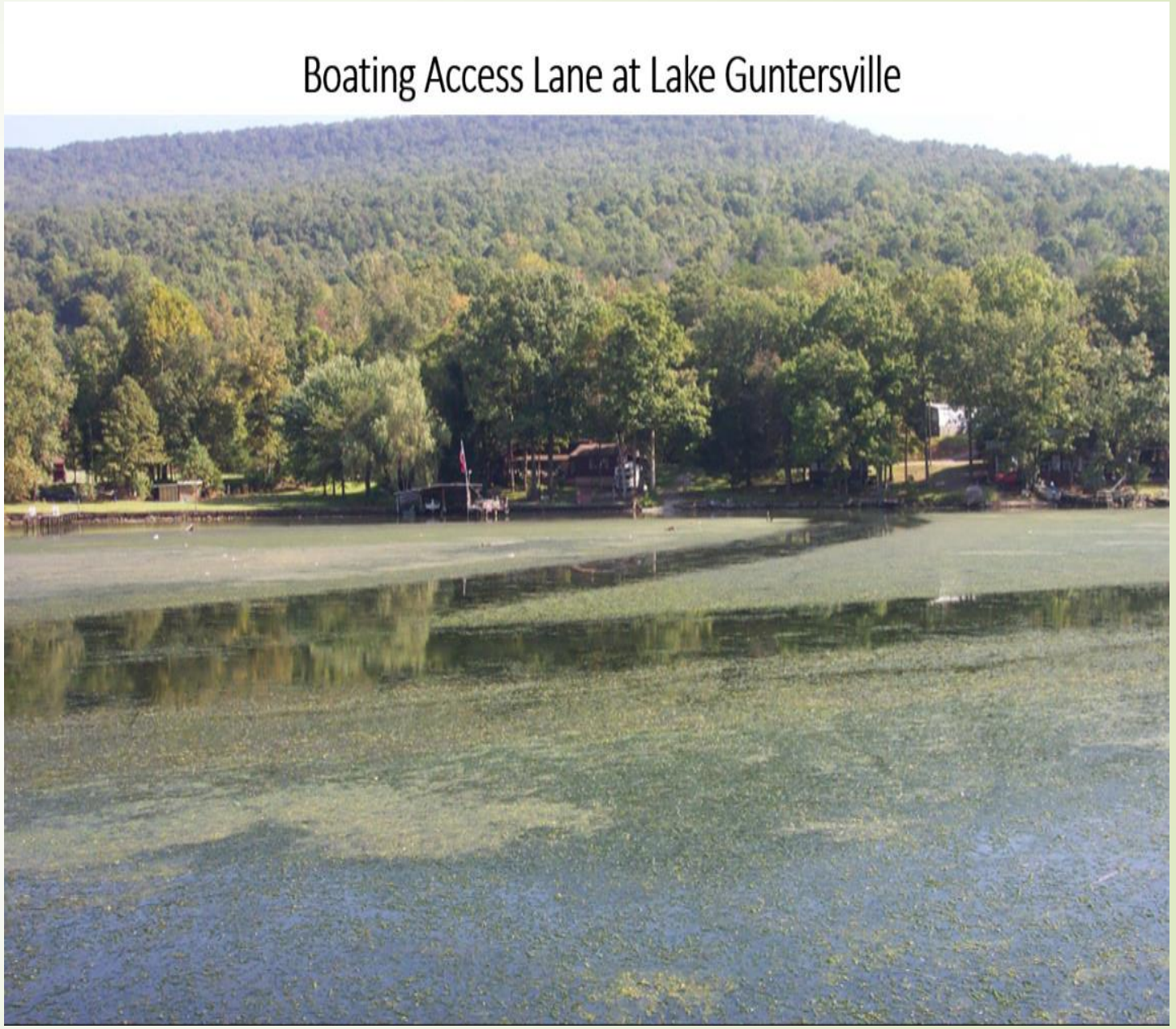
In Only A Few Weeks

Destroys the Ecosystem



Forget about
-Swimming
-Boating
-Recreation

Should Look Like A Lake, Not A Lawn



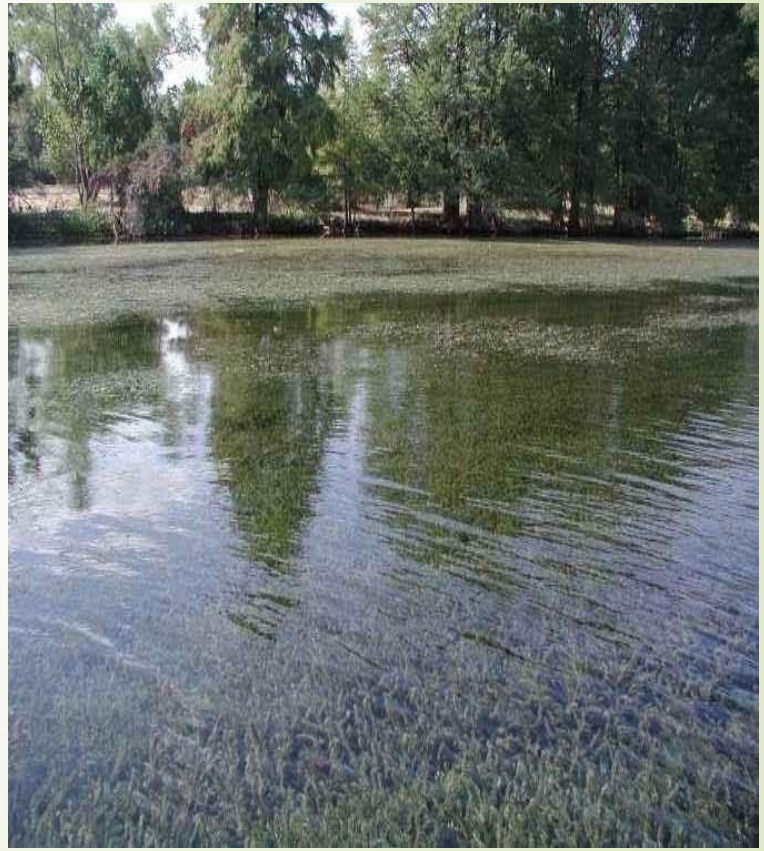
Does Anyone Want This?

How Fast Can Hydrilla Spread?

Santee Cooper Reservoirs In South Carolina

- 100 acres in 1983 when first discovered
- 200 acres in 1984,
- 400 acres in 1985,
- 800 acres in 1986. (Doubled for 3-years)
- **THEN**
- 2,500 acres in 1987 (Tripled)
- 5,500 acres in 1988,
- 15,000 acres in 1989.

From 100 to 15,000 acres in 6-years

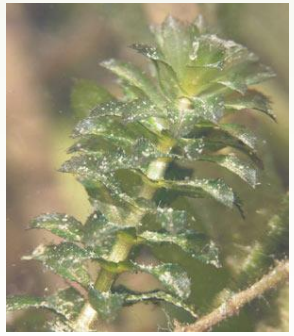


--- ECOLOGICAL IMPACTS ---

Aquatic Ecosystem Dynamics Is Drastically Altered When Growth Passes 30% Coverage

- Spawning Areas Are Eliminated
- Aquatic Habitat For Fish And Aquatic Organisms Is Taken Out Of Use—unavailable
- Water Circulation Is Prevented
- Dissolved Oxygen Plummets– Can't Support Fish Or Invertebrates -- Will Kill Both
- Raises pH
- Temperature Increases – Kills Aquatic Organisms, Drives Others Away
- Sunlight Cannot Penetrate, No Photosynthesis – Most Organisms Must Have Light
- Water Stagnates (Hot, No DO, Can Become Toxic)
- Rotting Mats Sink, Destroys Benthic Ecosystem
- Adds Significant Nutrients: Eutrophication--lake Aging Is Advanced
- Can Harbor Toxic Cyanobacteria (Blue-green Algae) – Can Kill Water-Birds And Eagles
- Perfect Breeding Ground For Mosquitoes
- Entire Area Becomes A Lifeless Desert

Cyanobacteria



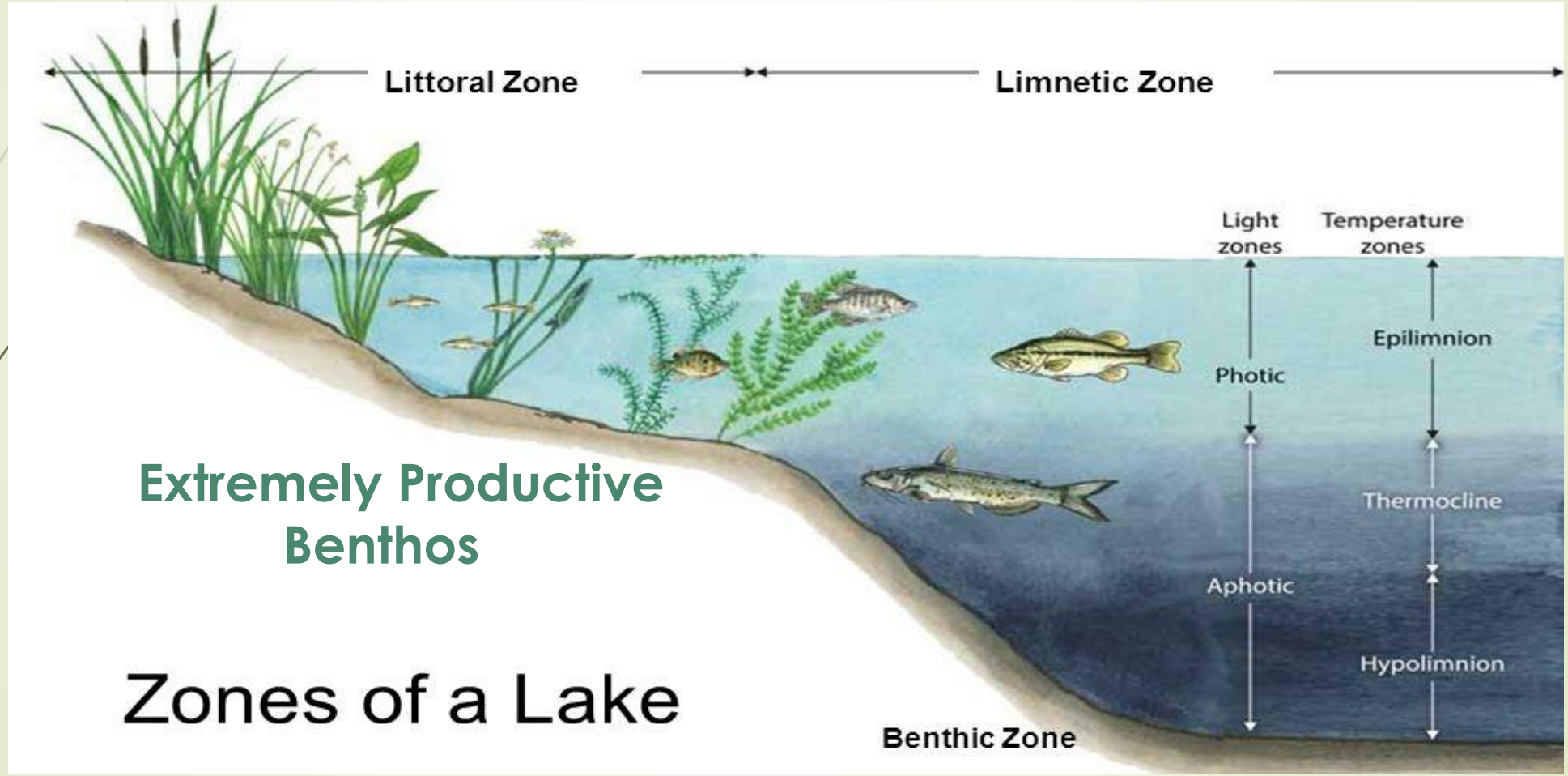
- Toxic To Water Birds, Turtles, Eagles
- Grows "**On**" Invasive Species
- Water Birds Consume Plant
- Develop Avian Vacuolar Myelinopathy (AVM)
- Eagles Eat Water Bird (Coot), Develop AVM -- Deadly

Researchers identify, name toxic cyanobacteria killing American bald eagles

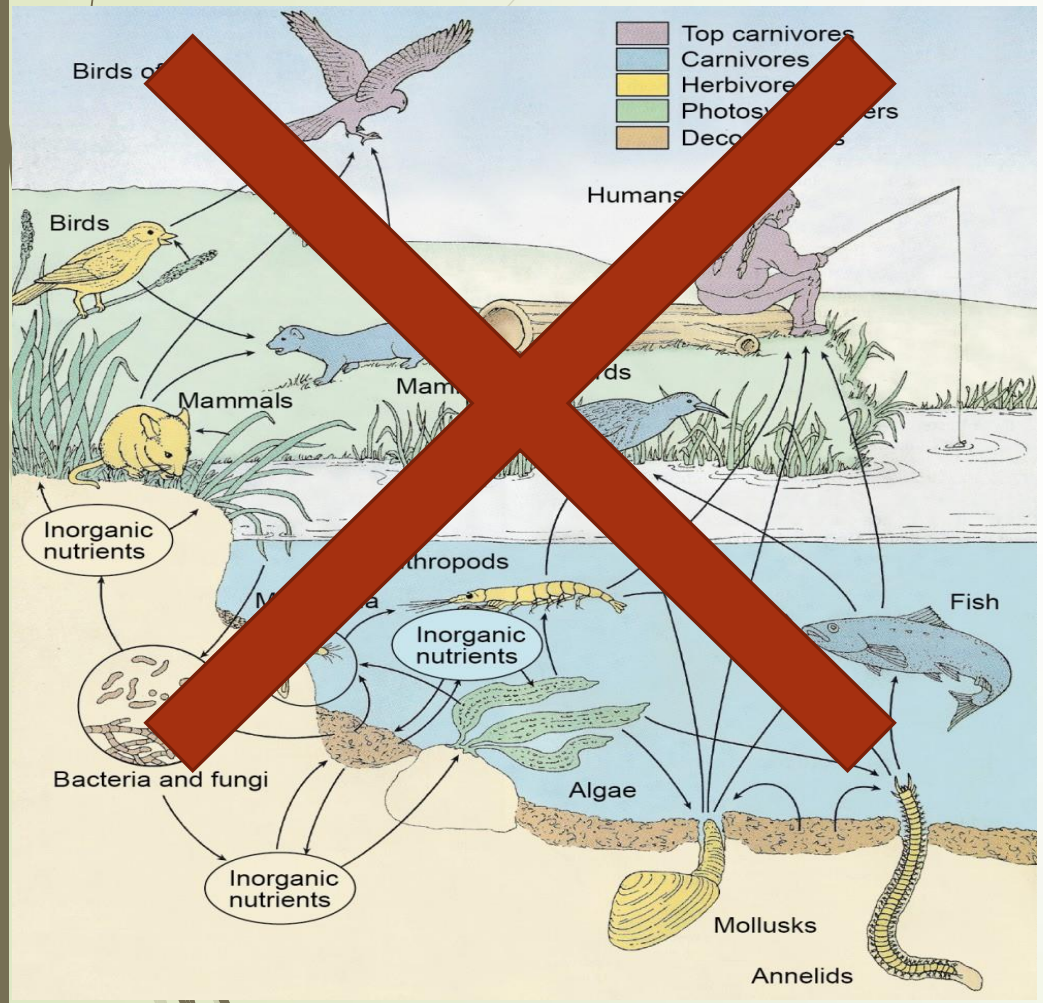
February 19, 2015 by Sandi Martin

Limnology 101 – Aquatic Ecology

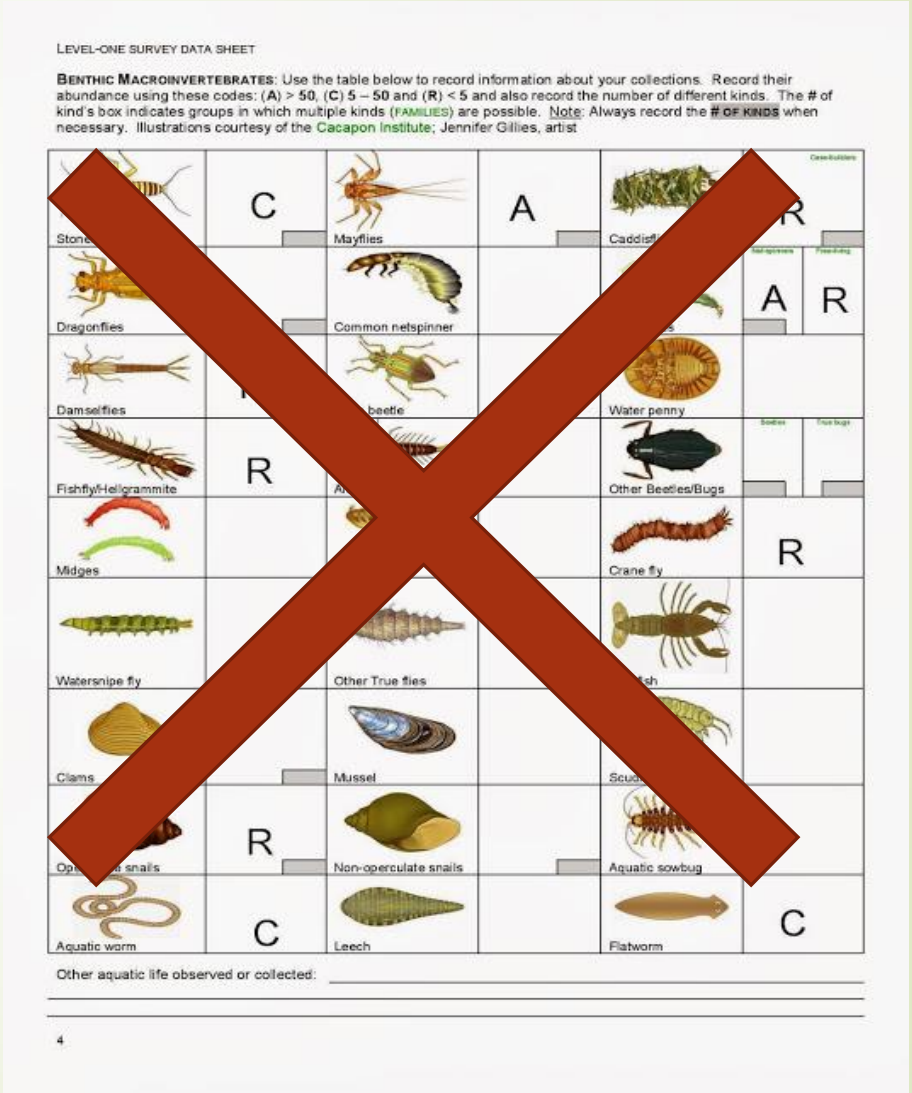
Littoral Zone in a Natural Lake



Benthic Macroinvertebrates = Major Food Source
Extreme Biodiversity and Productivity



- ~~Dissolved Oxygen~~
- ~~Sunlight~~
- ~~Water Circulation~~
- ~~Proper Temperature~~
- ~~Proper pH~~



Limnology 101 – Aquatic Ecology

Littoral Zone in a Natural Lake

The Tennessee River System Lakes Are Not *Natural* Lakes

They Are Artificial River Reservoirs

- Constantly Moving Water
  - Slow And Fast (Current)
- Constantly Exchanging Water (12 Days)
  - Water Quality From Upstream
  - Spring Rains/Runoff Have Greater Impact
- Constant Water Level Fluctuation
  - Severe In Winter Drawdown
  - Littoral Zone Becomes Terrestrial (Dries Out)
  - Severely Reduces Native Aquatic Vegetation Success
  - Kill Benthic Organisms: Invertebrates, Insects, Worms, Snails, Etc

“Natural Lake” Littoral Zone Cannot Exist in River Reservoirs

We Won’t See This

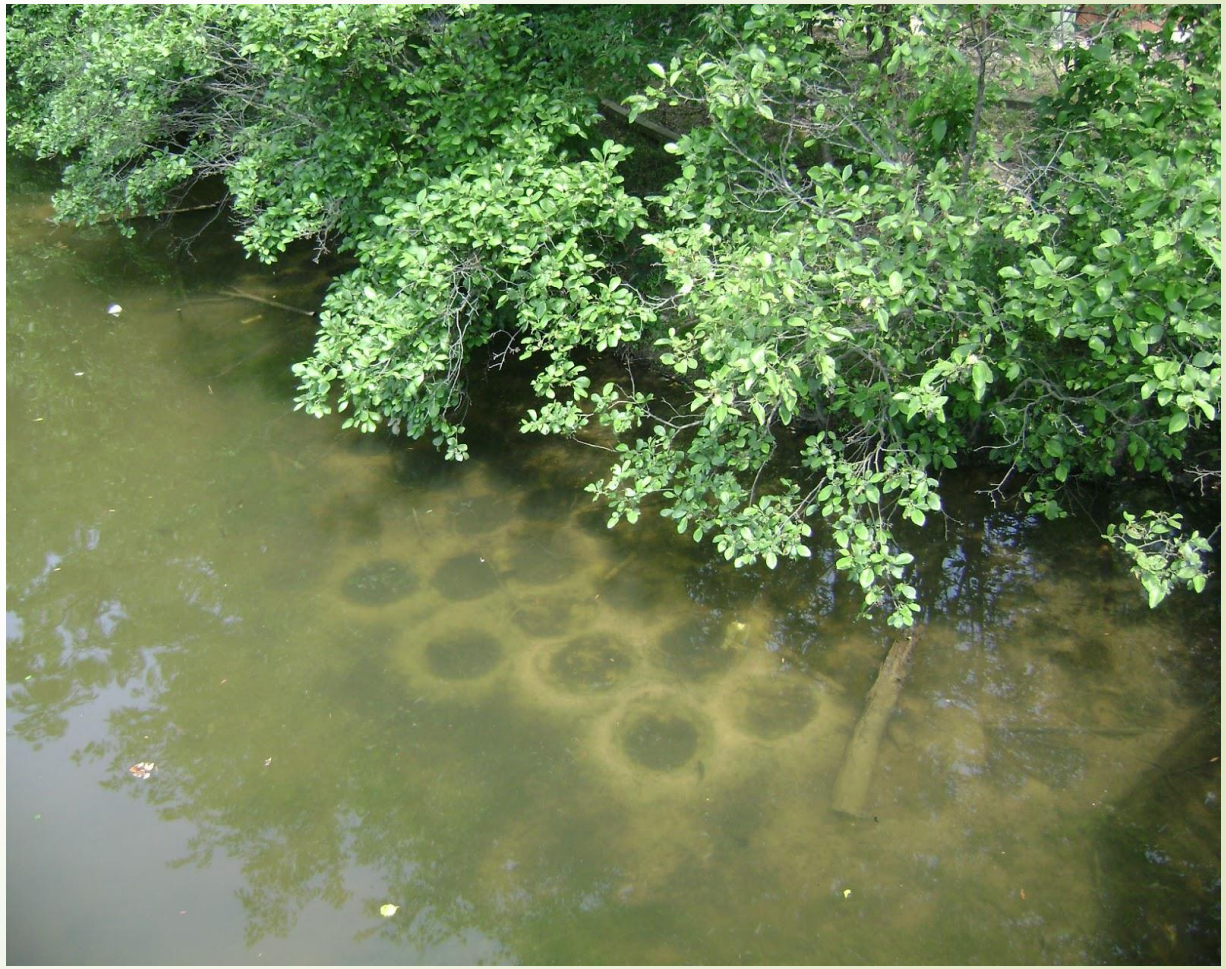
Some Fish Build Nests

Most Build Redds

Bluegill Redd

What Do Fish Need To Reproduce?

- Good Water Quality, Dissolved Oxygen (>5ppm), Proper Temperature, Good Light/Visibility, Water Circulation
- Substrate for Redd Building (Nests)
- Habitat/Protection for Young



Highly Productive

Typical Redds

The Perfect Redd

- Males Protecting Their Redd

Watts Bar Littoral Zone During Drawdown Devoid of Aquatic Plants

Aquatic Plant Survival Difficult to Impossible

Devoid of Aquatic Plants

- Not A Single Aquatic Plant in 200+ Feet of Shoreline

Devoid of Aquatic Vegetation

Same Area

Normal Pool

Winter Drawdown

No Aquatic Plants – Note The Redds ⟶

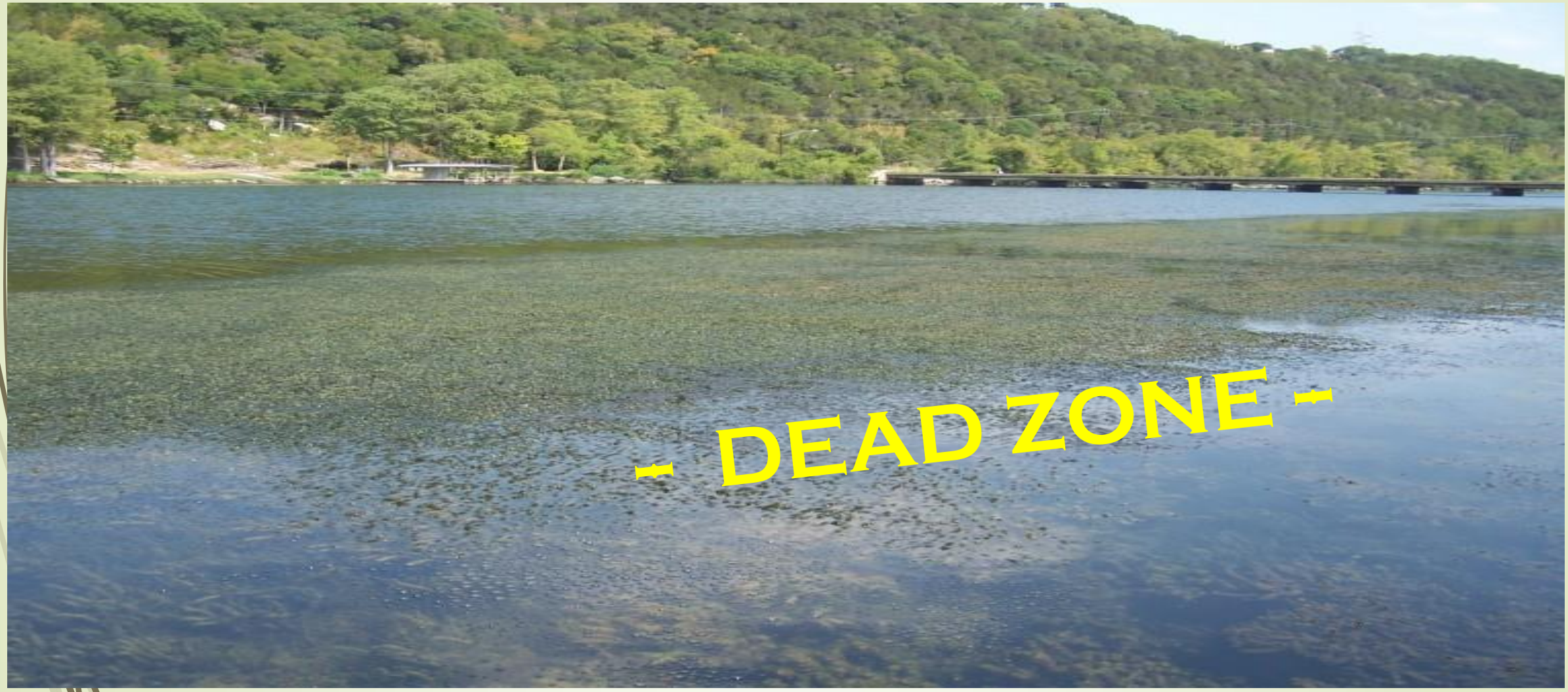
Look Closely – Sunfish Redds

More Productive If Aquatic Macrophytes Existed But It Is Still Highly Productive

Invasive Species are NOT the Answer

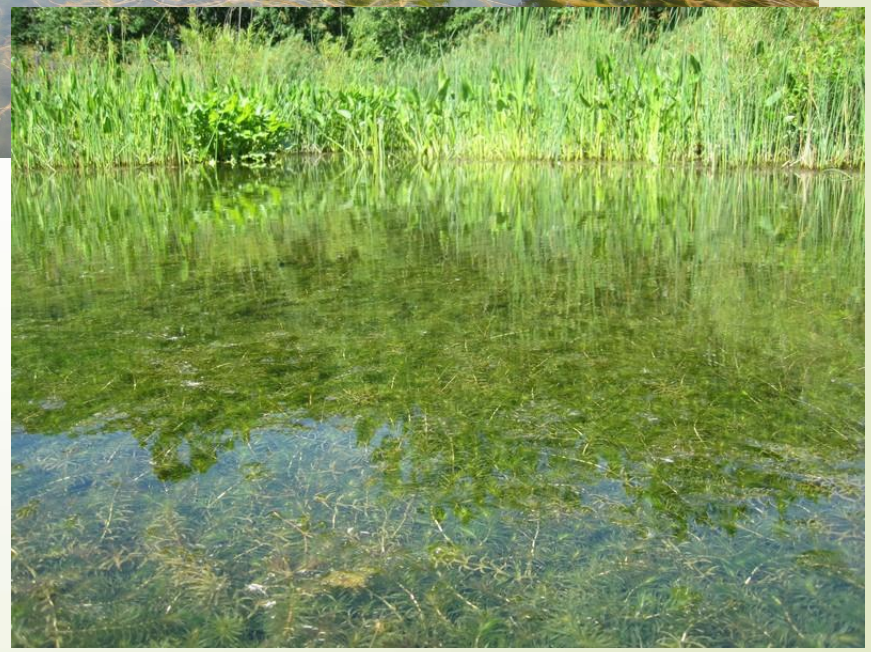
They Only Destroy

This Hydrilla "Amputates"
The Affected Aquatic Ecosystem From The Lake



Then It Rots, Sinks, and Continues It's Assault

Invasive Aquatic Plants Destroy the Natural Aquatic Ecosystem

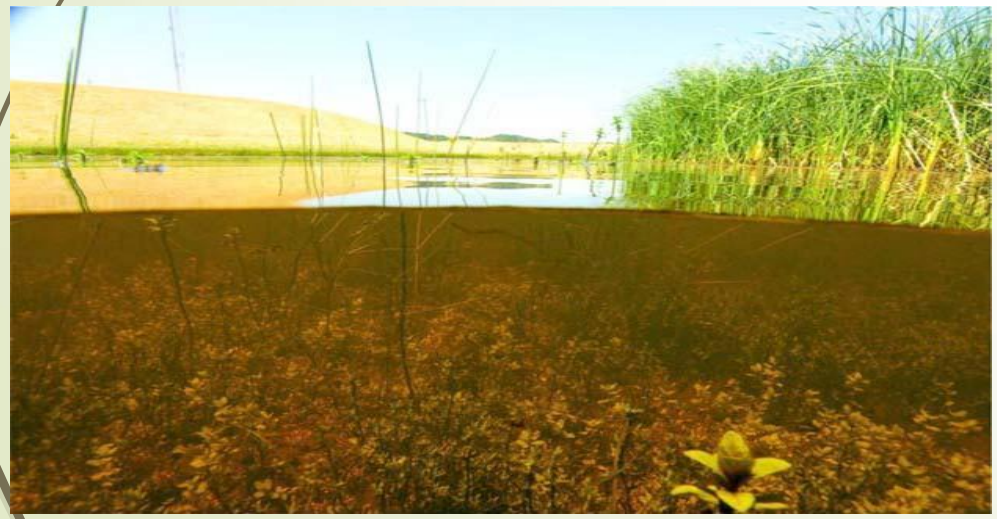


Remember These Impacts

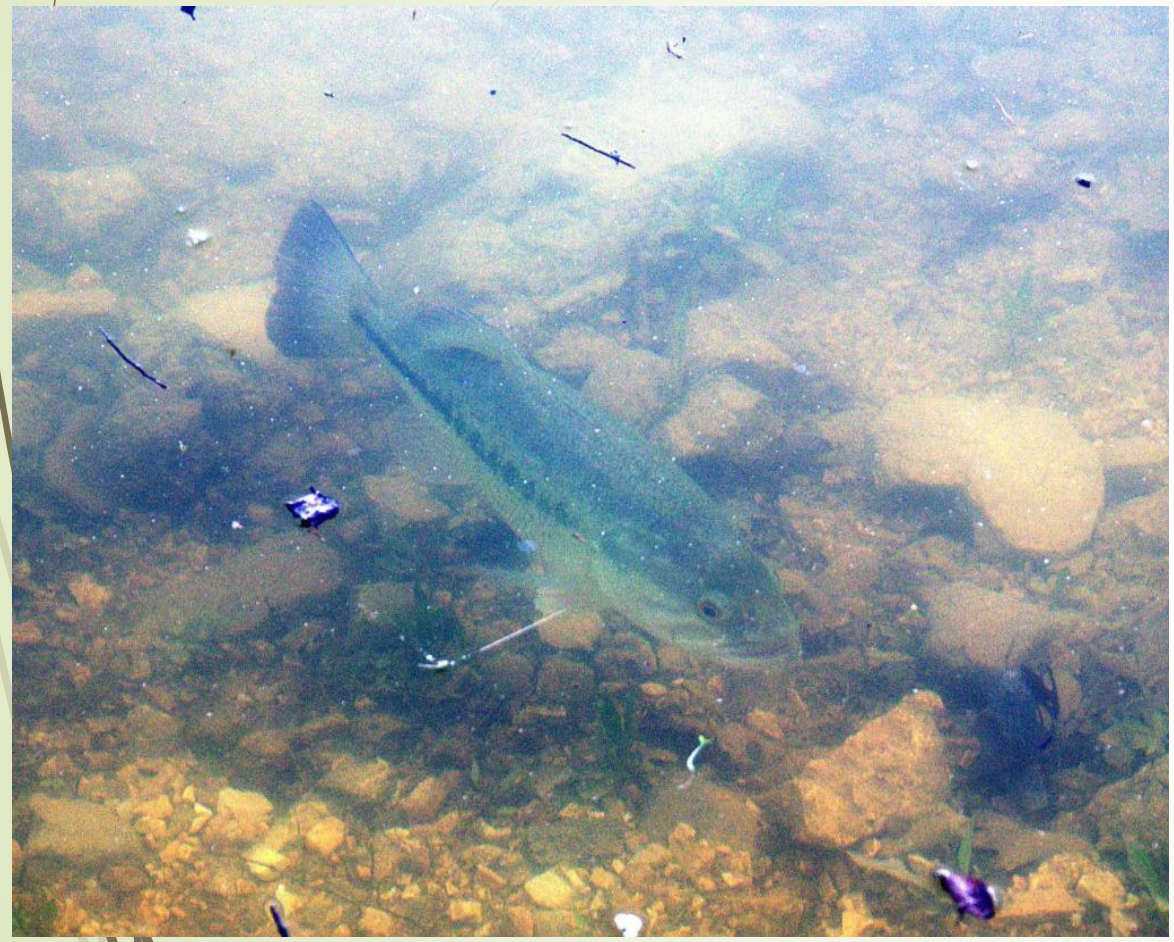
- **Spawning Areas Are Eliminated**
- Aquatic Habitat For Fish And Aquatic Organisms Is Taken Out Of Use—unavailable
- **No Water Circulation**
- **Dissolved Oxygen Plummets**– Can't Support Fish Or Invertebrates -- Will Kill Both
- Raises pH
- **Temperature Increases** To Lethal Levels
- Macroinvertebrate Populations ELIMINATED
- Sunlight Cannot Penetrate Mats/No Photosynthesis – Most Organisms Must Have Light
- **Water Stagnates** And Can Become Toxic
- Rotting Mats Adds Significant Nutrients: Eutrophication--lake Aging Is Advanced
- Can Harbor Toxic Cyanobacteria (Blue-green Algae) – Can Kill Water Birds And Eagles
- Perfect Breeding Ground For Mosquitoes

This -- Does NOT Allow. -- This

This -- Does NOT Allow. -- This



This Bass Guarding His Redd



Can't Deal With This

If A River Reservoir Can't Provide Littoral Zone Aquatic Vegetation, Can Anything Substitute?

YES!

- Manmade Artificial Habitat
- Often More Productive/Sq. Ft. Than Natural Habitat
- Simple -- Any Material Or Design
- **Provides Surfaces For Algae, Insects, Snails, Mussels, Zooplankton -- Food For Fish**
- **Provides Surfaces For Laying Eggs (Insects And Fish)**
- **Provides Shelter And Protection From Predation For Fry And Fingerlings (Young Fish)**
- Will Become Home For Many Species Of Organisms Including Fish
- Last Many Decades

This ---- For ---- This

Mimics Aquatic Vegetation

---- This Unused Siding

For This Habitat----

Truly Ambitious

Fisherman Helping Fish

Protects Small and Young Fish

Fish Condo – Free Rent

Huge Surface Area for Algae/Insects and Other Food Organisms, Including Inside The Pipes

Anything Goes

BB&B

Bass Bed & Breakfast – Compliments of the COE

Food and Shelter Coming Up

(Actually, going down)

Don’t Rock The Boat

Any Material

Let Your Imagination Be Your Guide

Crappie Condos

Sand & Gravel Beds for Redd Building And Protective Habitat -- During Drawdown

Ready For The Water

All For This

And This

Fisherman Are Highly Educated in "Catching Fish"

- Place, Depth
- Time Of Day
- Lure, Bait, Action
- Water Temp, Sunlight,
- Shoals, Rock Ledges, Logs

While I Have Extensive Education And Experience In Fisheries Biology, Limnology, Phycology, And Have Spent 50-years In Fishery Research, Environmental Impacts, Ecosystem Assessment, YET -- I Know Very Little About "Fishing."

How Many Fisherman Understand Ichthyology, Fishery Biology, Limnology, Aquatic Ecology, Fecundity, Reproduction, Benthos, Ecosystem Dynamics, Phycology? They Don't Need That Knowledge To Be Great Fisherman.
YET -- Being Educated In Fishing, Doesn't Yield A Knowledge Of Fishery Biology Or Aquatic Ecology.

Because *Invasive Aquatic Plants* Benefit *Fishing*, Many Fishermen Are Convinced The Plants Must Be Good For The Fish – They Are Not.

- Because Game Fish And Forage Fish Are Forced To The Edge Of The Mats
- Fish *Density* Is Increased, Thus "FISHING" Is Indeed Easier
- PLEASE
- Don't Confuse 'Catching' More Fish, With More Fish Being Produced
- Less Breeding Habitat, Fewer Food Sources, Loss Of Habitat
- Means **Fewer Fish**

Where Are The Fish?

If Invasive Plants Cover 40% Of An Area, "Catching" A Fish Increases By 40% Or More
Beneficial For "Fishing" – Detrimental For Fish

A Lake Without Invasive Plants Produces:

More Fish Every Year,

Larger Fish,

Healthier Fish, and Aquatic Ecosystem

Greater Biodiversity

And Is FAR *More Productive*.

- This Provides A Greater Fishing Opportunity
  -- Just A Bit More Challenging --

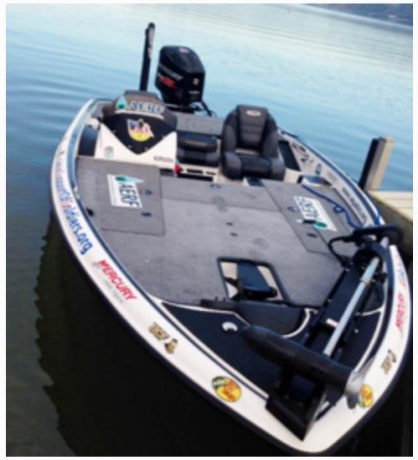
WHAT DO PROFESSIONAL FISHERMAN KNOW?

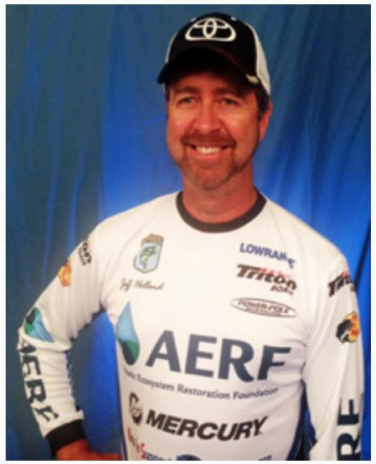
Jeff Holland

AERF
Aquatic Ecosystem Restoration Foundation

The Aquatic Ecosystem Restoration Foundation (AERF) is committed to sustainable water resources through the science of aquatic ecosystem management in collaboration with industry, academia, government and other stakeholders. This organization provides science-based solutions to restore and maintain sustainable water resources. You can visit their site at: http://www.aquatics.org/

AERF states that "One of the large challenges in aquatic weed control is buy-in from fisherman that there is a real difference between a healthy native plant community and a dense monoculture of invasive weeds. While a stand of invasives can provide good fishing habitat initially, it's very nature will soon degrade the fishery. One of AERF's strongest spokesmen on this issue is Jeff Holland, a professional biologist and competitive bass fisherman. Jeff has always felt that anglers represent the most passionate, vocal, and organized lake user-groups in the US, and has enjoyed the pleasure of sharing AERF's mission with these recreational enthusiasts over the last four years. Jeff Holland, is a full time biologist who has been competing as a professional bass angler on the Bassmaster Open trail."





The WBEFC contacted Jeff about this. As a professional fisherman and a biologist, Jeff fully understands the ecological and fishery aspects of aquatic plants in natural ecosystems, and when invasive species form dense mats. He knows that an invasive species is indeed beneficial to the ecology and fishery, "Until" the density takes over and serious harm is done to the ecology and the fishery. Jeff welcomes you to visit his Website: www.jeffhollandfishing.com

Jeff is not the only professional fisherman who understands. Michael Neal, a local professional fisherman also fully comprehends the ecology and fishery aspects of invasive plants. http://wbefc.org/2017/06/11/neal-joins-twra-in-battle-against-aquatic-nuisance-species/

This is what the WBEFC is striving to explain. Please see the Ecology/Fishery Primer on our Website to fully understand this ecological situation at: http://wbefc.org/ecology-primer/

The species of plant is not the problem, only the plant's density.

Michael Neal

Neal joins TWRA in battle against aquatic nuisance species

Professional bass angler, Michael Neal joined the Tennessee Wildlife Resources Agency [TWRA] in the fight to stop the spread of aquatic nuisance species [ANS] in Tennessee waterways.

Neal travels with the FLW Tour and fishes throughout Tennessee and the U.S. Having fished his entire life, he's seen the effects of ANS and hopes to bring attention to the issue.

ANS include any non-native species, plant or animal, which has a negative impact on the environment, economy and public health. Some of the commonly known ANS in Tennessee include Asian carp, zebra mussels and hydrilla.

ANS are spread primarily through human activities such as emptying ballast water, dumping bait buckets, using dirty fishing gear and intentional release. The impacts are shocking.

According to the ANS Task Force, a national group overseeing the impact, education and control of ANS, "The costs to control and eradicate invasive species in the U.S. alone amount to more than $137 billion annually."

Sport fishing in Tennessee was estimated to have a $1.1 billion impact across the state in 2001.

Neal said he recognizes the impact ANS can have not just on bass fishing, but the rich diversity of Tennessee's waters.

"TWRA does a great job managing our fisheries; but without everyone's involvement to stop the spread of ANS, their job is much harder," he said. "Tennesseans are rich in water and diversity. We have beautiful places to fish and boat. Why not join in the effort to care for it?"

Neal has filmed public service announcements for the agency and added the ANS logo on his boat and truck.

Angler Clubs Improve Fishery

Shown here are Porcupine Crib fish habitat structures that are ready for final assembly

Invasive Species Destroy Natural Ecosystems

If You Don't Want This ---

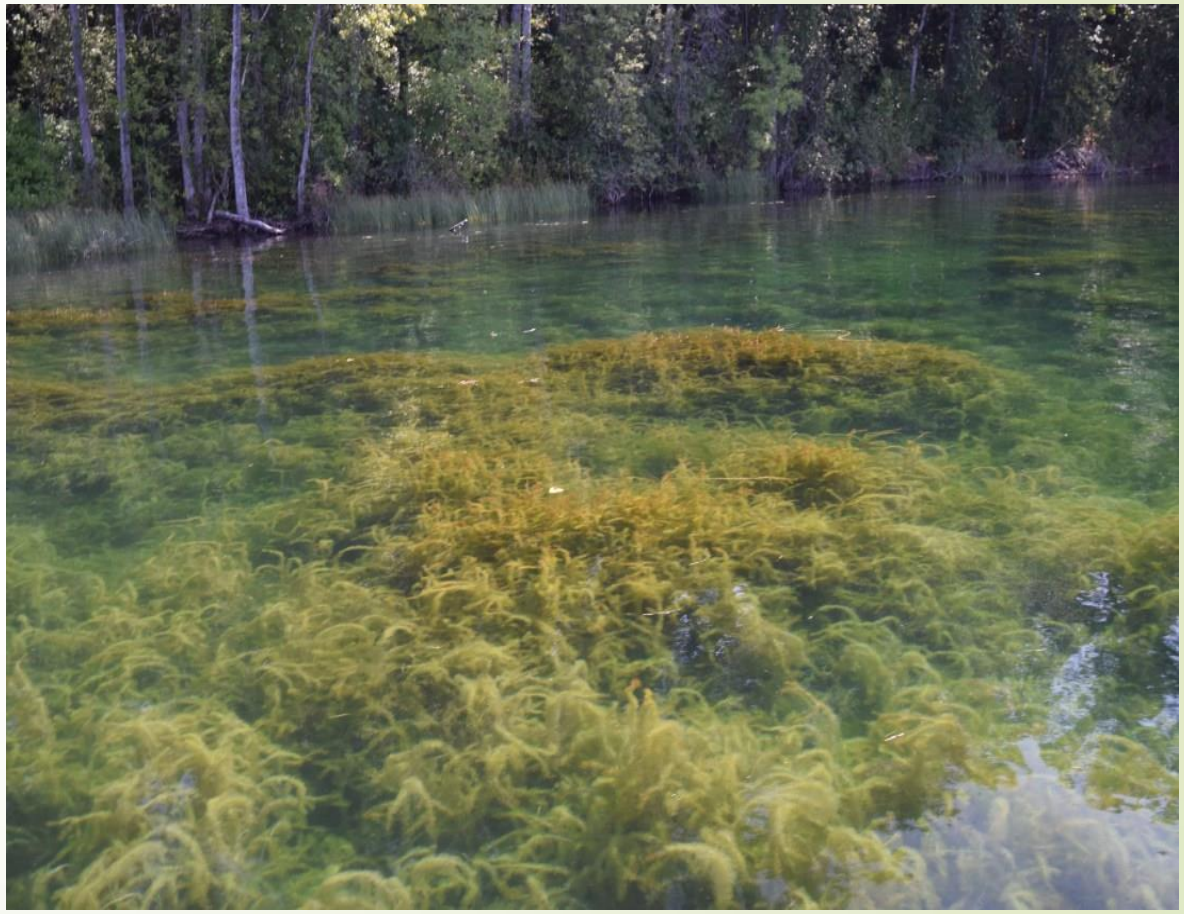
Or This

Or This

Then Why This?

Simply Put

=



Terrestrial Invasive Plant

Aquatic Invasive Plant

Simple Fact of Environmental Science

- Nothing is superior to a ----- "Natural Ecosystem"

Invasive species are never part of a Natural Ecosystem
They only alter and destroy the ecology

What Must Be Done?

Since We Can Never "Eliminate" The Presence Of Invasive Aquatic Plants, It Is Absolutely Critical We

Reduce and Control the Spread

--- Options ---

- Chemical
- Mechanical
- Biological
- Environmental

The chemicals used by commercial applicators for control of invasive aquatic plant species on Watts Bar Lake include: 2,4 D, Komeen, Sonar, Reward, Clipper and Aquathol.

A general discussion on the risks related to these chemicals is being prepared and will be placed here as soon at it is completed.

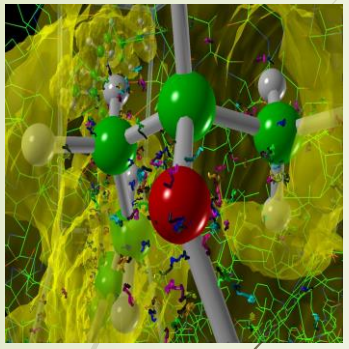
Each of these has undergone federal review and assessment for use in aquatic systems. The Safety Data Sheets (SDS) for each of these chemicals is provided here for your reference.

- 2,4-D
- Sonar-AS
- Clipper
- Reward
- Requirements for Registration of Aquatic Herbicides
- Will Herbicides Hurt Me or My Lake
- Miscellaneous Information
- Komeen
- Aquathol-SDS

These companies have approval that will expire in 2017-18. You may go on the TDA website at tn.gov/agriculture, Click on pesticides and then Online Pesticide Systems, you may key in the charter number to check the current status.

- Private Application Companies
- Laws and Regulations

Chemical Herbicides



- Chemical Control Of Aquatic Plants Is No Different From Chemical Control Of Terrestrial Plants.
- We Spray Our Lawns For Weed Control
- We Spray Our Gardens And Inside Our Homes For Insect Control
- We Use Roundup To Kill All Plants.
- Although We Should Wear Masks, Eye Protection, Long Pants And Long Sleeves, Most Of Us Don't. We Receive Overspray Directly On Our Bodies
- BUT LOW LEVELS

Chemical Herbicides

- Herbicide Release Often Underwater
- When Sprayed Properly, Overspray Is Not A Factor – Stream Not Mist
- Extremely Low Levels In Water Will Kill Plant Species
- So Dilute That A Few Feet Away It Becomes Undetectable
- Sunlight/UV Quickly Breaks Down Chemicals
- Organic Material In Water Column Eliminates Chemicals Quickly
- **Copper Is Common In Chemical Herbicide**. The Amount It Takes To Kill A Plant Is Less Than In A Daily Multiple Vitamin.
- **Extensive Independent And Government Research Has Been Carried Out On All Aquatic Herbicides– All Approved For Use Have Been Shown To Pose No Risk When Properly Applied**

Detailed Discussion Go To

WBEFC.ORG

The FACTS Regarding Aquatic Herbicides

Introduction

There is a great deal of misinformation being provided in writing and orally by opponents of aquatic herbicide use in Watts Bar Lake. These individuals often speculate and voice their opinions about risks and dangers as if factual, when they are in reality untrue and often technically impossible. Doing so only scares lake users by asserting serious health dangers which simply do not exist—causing such anxiety is wrong and should not be tolerated.

Thus, it is imperative to understand the factual human health and environmental risks of placing any chemicals in our public waters. The following discussion is based entirely on technical datum and extensive laboratory and field research—it is the science behind the proper use of aquatic herbicides in a lake ecosystem.

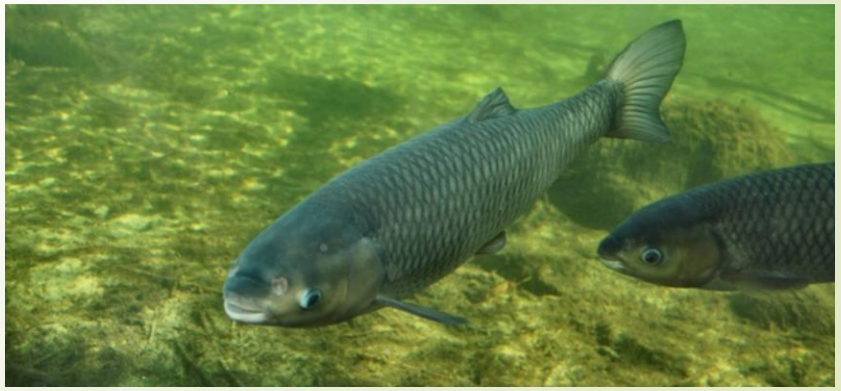
Mechanical Harvesting

Removing Plants
The Old Fashion Way

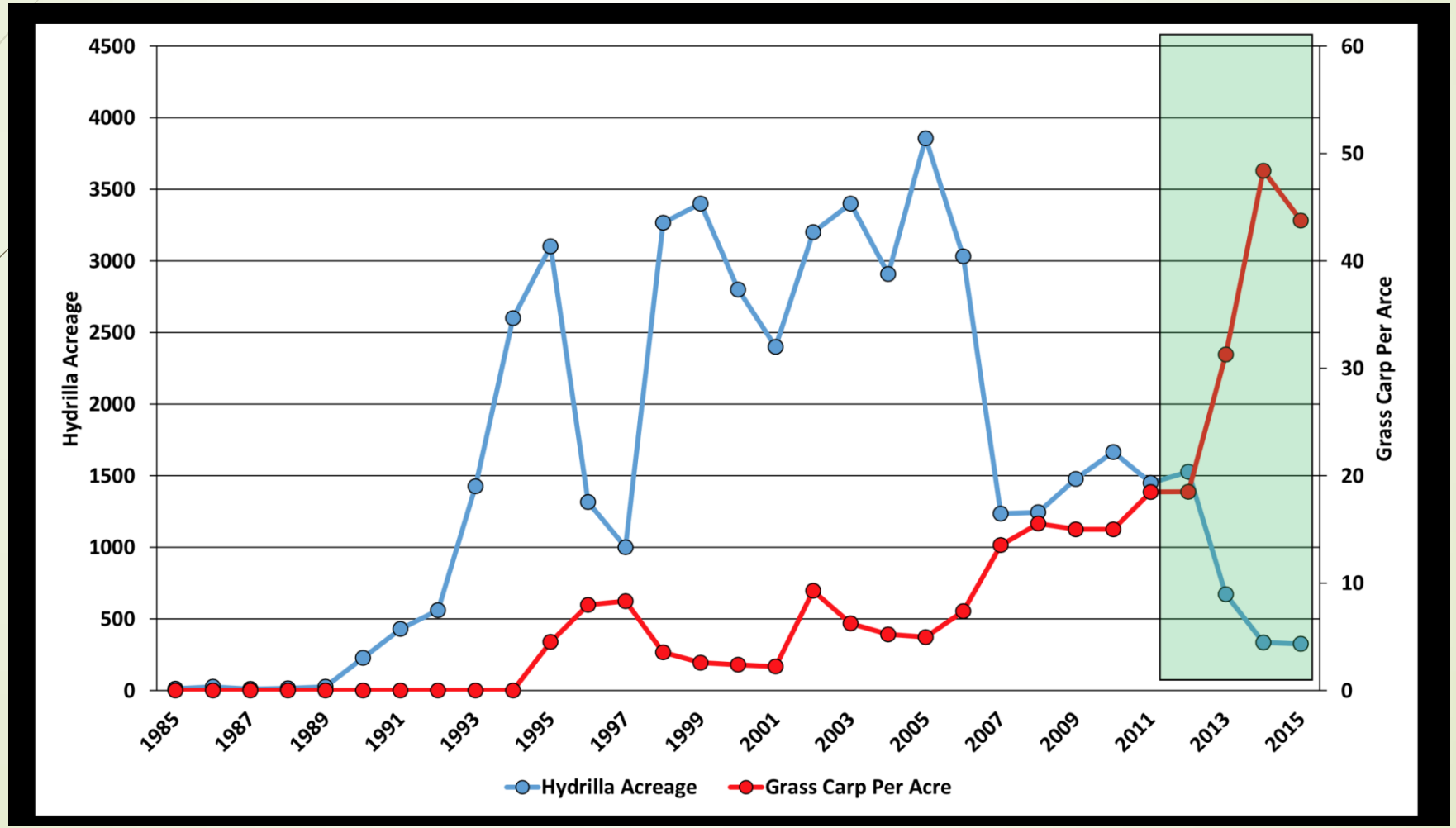
Or Mechanical Harvester
Now Available On Watts Bar
(Visit WBEFC.ORG)

Biological Control

- White Amur (Grass Carp) -- Triploid – Sterile
- Can Live To 20+ Years
- Herbicides 3-applications/Summer
- Amur Remain Year To Year, Low Restocking Needed
- Fish Can Consume 150% Of Body Weight/Day
- Used Extensively With Great Success In Large And Small Lakes
- Will Consume Some Native Aquatic Vegetation – However, River Reservoirs Have Little Littoral Vegetation – Any Loss Would Be Of Little Or No Consequence
- Most Are Hard Stemmed (Water Willow, Bullrush)



-- Lake Gaston --
Hydrilla Expansion and Grass Carp



By Brett Hartis

DATE UPDATED: Monday, February 10, 2014

If I told you that a creature nearly 5 feet long, up to 80 pounds, and capable of eating nearly 150% of it's body weight A DAY was lurking in Lake Gaston (and now Kerr Lake), you would likely be concerned.... Well, in actuality there IS a creature such as this that you share the water with in many reservoirs, lake, and ponds across the United States. Don't rush out of the water just yet however....

Known to scientists as Ctenopharyngodon idella, the white amur or grass carp is a herbivorous (only eats plants!) fish introduced to control nuisance aquatic plant species. The grass carp is actually native to large river systems of Eastern Asia and has been distributed worldwide for use as a biological control and as a food fish. Despite what one might think, the grass carp is very different from the well-known common carp, which is also nonnative having been introduced from Europe. One noticeable difference in the location of the grass carp's mouth which is located on top of the head for feeding on plants. The mouth on the common carp is positioned low on the head to aid in bottom feeding in shallow water. Grass carp can live nearly 25 years and can grow as much as ten pounds per year. As eluded to earlier, grass carp consumption is obviously dependent on the size of the fish but these fish have amazing appetites. Carp over 15 pounds consume up to 30% of their body weight daily, whereas smaller fish (less than 10 pounds) consume as much as 150% of their body weight a day. Feeding does slow down in colder water (below 55 degrees) or when oxygen levels in the water drop.

Grass carp are generalists feeders and will eat almost any plant material however they do prefer the more tender, soft material of submersed species over the waxy, sometimes hard material of floating and emergent plants. Grass carp have a sweet (or green rather) tooth for southern naiad, hydrilla, and duckweed. There is one exception to the grass carp's diet as they do NOT care for Eurasian water milfoil. Grass carp are also poor controllers of filamentous algae.

Grass carp stocked in North Carolina reservoirs are triploid, which means that they are infertile and unable to reproduce. This keeps grass carp populations in a water body "in check" and allows the NC Wildlife Resource Commission to track and model grass carp populations in a Lake. This is important because stocking too few grass carp annually will have little to no affect on controlling problem species like hydrilla. Overstocking can also lead to rapid devegetation of a lake which can negatively affect water quality. Grass carp are also only stocked into water bodies in which they can be contained to prevent their escape downstream. While grass carp are extremely effective in controlling invasive submersed plant species, they will also feed on native species and if allowed to be introduced into open system, could devastate native plant populations.

Hopefully, you have learned a little more about grass carp. Next time you see large fin snaking through the shallows, remember that this is likely a grass carp innocently feeding on vegetation and aiding in plant management in the Lake. Although large and menacing looking, these fish are merely "cattle with fins" who are an integral part of plant management on the Lake. For more information about grass carp, see the "web links for more information". Pictured is a grass carp caught during research on Lake Gaston in 2013.

WEB LINKS FOR ADDITIONAL INFORMATION:

AERF BMP Handbook - Chapter 10

UF Grass Carp Bulletin

If you have questions please contact your Aquatic Extension Associate, Dr. Brett M. Hartis, at (919)-515-5648 or email at bmhartis@ncsu.edu.

Environmental Controls

- Lake Level Alterations – Winter Drawdown
- Weather – Major Factor
  - Cold Winters
  - Heavy Spring Rains
  - Significant Water Movement

Reduction and Control is Expensive
Potential Methods For Funding

Federal/State/Local government
Utility Company Funds Removal (Alabama Power pays for property owner chemical control)
Lakeside Property Owner Tax
Local Business Donations
Recreational User Tax
Boater use fee/sticker – Illinois did this.
Fishing/boat supplies Tax
Tournaments Fee Tax
Municipalities Fees for Water Usage
Other tax (Florida has a $.02 per gallon gas tax for aquatic weed control)
NC and VA counties of Lake Gaston -- $116,000/county
City of Virginia Beach -- $270,000/year
Lake Gaston 2016 budget $1,150,000
Guntersville Lake, about $1 million to date
Local Property Owners Fund Their Own Removal
OTHER

-- INVASIVE AQUATIC PLANTS --

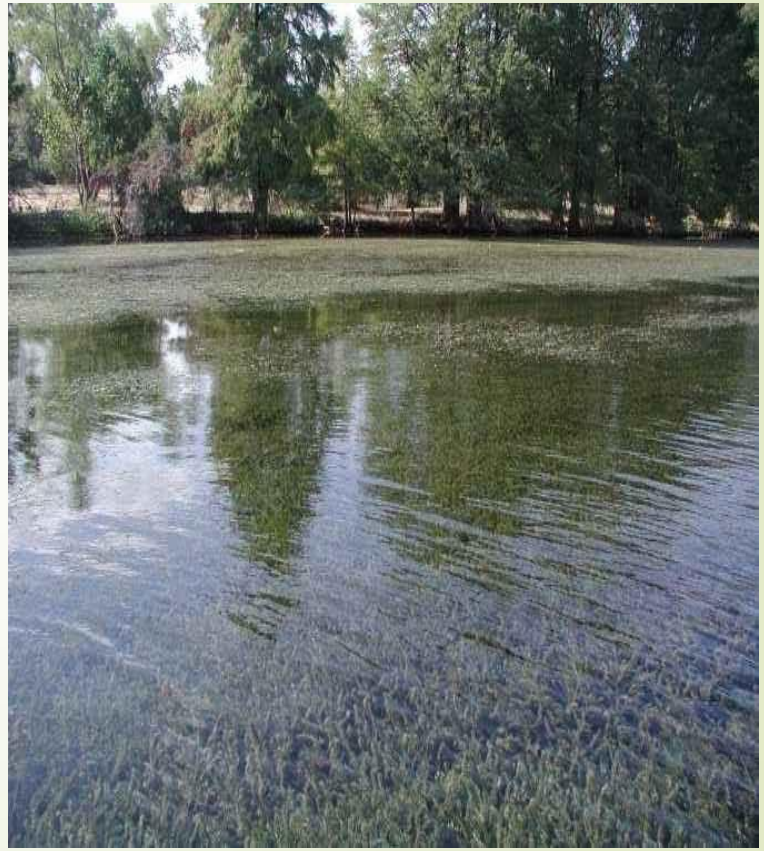
WE MUST BEGIN CONTROL NOW!

- **The Longer We Wait**
  - The Faster The Expansion Will Increase
  - Previously Unaffected Areas Will Be Overtaken
  - The Higher The Cost Of Control (Exponentially)
  - The Greater The Damage To The Ecology/Fishery
  - The Harder It Will Be To Take Control
  - The Greater The Economic Impact
  - 2016 Chickamauga Lake >20,000 Acres
  - 2016 Guntersville Lake >6,200 Acres
  - 2017 Watts Bar Lake, “Rough Estimate” >800 Acres

REMEMBER THIS SLIDE

Santee Cooper Reservoirs In South Carolina

- 100 acres in 1983 when first discovered
- 200 acres in 1984,
- 400 acres in 1985,
- **800 acres in 1986. (Doubled for 3-years)**
- **2,500 acres in 1987 (Tripled)**
- **5,500 acres in 1988,**
- **15,000 acres in 1989.**

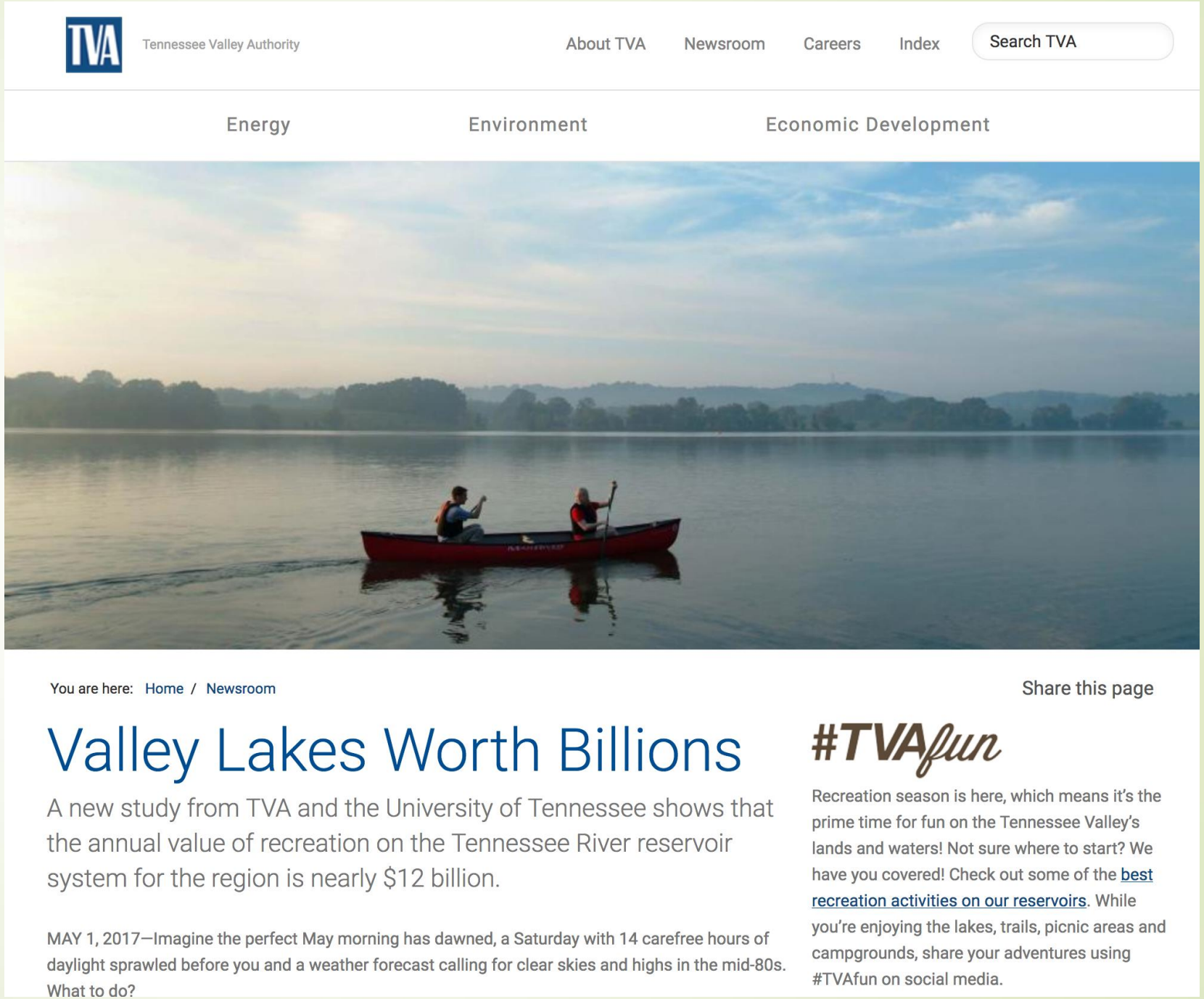


FROM 800 ACRES TO 15,000 ACRES IN ONLY *3-YEARS*

In Addition To Ecosystem Damage By Invasive Plants Economics Is Severely Impacted

- Property Values Are Reduced
- Swimming Is Prevented
- Boating Is Difficult To Impossible
- Shoreline Becomes “Useless” For Recreation
- Aesthetics Becomes Offensive And Distressful
- Putrid And Odoriferous
- Rotting Vegetation Increases The Rate Of Lake Eutrophication
- Can Harbor Toxic Bacteria (VERY SERIOUS)
- Perfect Breeding Ground For Mosquitoes And Leaches
- Recreational Value Of Lake Reduced Significantly
- Watts Bar Lake – Recreational Value Is $1million/Mile Of Shoreline
- TVA Lakes Have Nearly $12 Billion Economic Impact To Region

Brings $$$ To Local Economy



How Much Is This Worth?

How Much Is This Worth?

Putrid and Ugly

Recreation Impossible

Significant Economic Impact

Which Shoreline Is Worth A Million $$$/Mile?

Which Improves The Fishery?

or

or

More Fish—Healthy Fish

No Fish – No Macroinvertebrates, No Habitat

Sand Island – What Happens When Hydrilla Takes Over?
No Invasive Species of Any Kind Belong In The Lake—EVER!

Help Protect/Defend The Ecology And Fishery of TVA System Lakes

Please -- Log on to WBEFC.ORG and become a "Stakeholder"

By doing so, you are declaring your support for a Healthy Aquatic Ecosystem in the TVA/Tennessee River System Lakes

No Cost To You Whatsoever
No Personal Information Will Be Shared
You Will Receive Updates On Council Activities
Only A "Few" Emails/YEAR Sent Out
Have Access To All Educational Materials And Information
Keep Informed On Actions Related To Control Of Invasive Plants
Know What TVA/TWRA/Others Are Doing Regarding Control
Stay Informed On The Spread Of Invasive Species
Stay Current On New Science And Information

wbefc.org → Contact Page

WBEFC
Watts Bar Ecology and Fishery Council

Our address

Watts Bar Ecology and Fishery Council
335 Goose Point
Spring City, TN 37381

Get Involved

Help shape the future of Watts Bar Lake

MAKE A CONTRIBUTION:

The WBEFC would appreciate your financial help.
Make tax-deductible contribution payable to: "WBEFC" and mail to:

Gary Bemm
WBEFC Treasurer
335 Goose Point
Spring City, Tn. 37381
Thank you for your support.

Send us a message

We want to hear from you!

Your name

Your e-mail

Make Selection

Telephone

☐ I would like to join the Board of Directors

☐ Add me to the Stakeholder eMail list

Subject

Message

SEND A MESSAGE

Tennessee River Ecosystem > A Million $$$$$$ Per Mile

Amazing

Serene

Exuberant

Stunning

Joyful

Relaxing

Tranquil

Fun

Fantastic

Peaceful

Working Hard To Protect
This Wondrous Aquatic Ecosystem

Tim Joseph

Thanks For Listening

WBEFC
WATTS BAR ECOLOGY AND FISHERY COUNCIL

wbefc.org